

Water Supply & Sanitary Engineering (DI05006021)

Unit 1: Introduction to Water Supply Engineering
Lecture 1: Importance and Fundamentals of Water Supply

GTU Diploma Engineering

Agenda

- Necessity of Water
- Importance of Water Supply Engineering
- Objectives of Water Supply Schemes
- Role of a Water Supply Engineer
- Public Health and Protected Water

The Fundamental Necessity of Water

- Water is essential for life; the human body consists of about 60-70% water.
- Without water, no civilization can survive. Historically, major civilizations developed along riverbanks (e.g., Indus Valley, Nile).
- Modern society relies on water not just for drinking, but for sanitation, industrial processes, and agriculture.
- Rapid urbanization has led to concentrated demand, requiring engineered supply systems.

What is Water Supply Engineering?

- It is a branch of civil engineering that deals with the collection, treatment, and distribution of water.
- Ensures water provided is safe for human consumption (potable).
- Involves the design and construction of structures like dams, intake structures, treatment plants, and distribution networks.
- Focuses on maintaining a continuous, pressurized supply to every household or industry.

Importance of Water Supply Engineering

- Prevention of Waterborne Diseases: Typhoid, cholera, and dysentery are prevented by supplying treated water.
- Industrial and Economic Growth: Industries require a massive and reliable water supply to function (e.g., cooling, processing).
- Fire Protection: A robust water distribution system with hydrants is the primary defense against urban fires.
- Public Convenience and Sanitation: Enables the use of flush toilets and modern sewerage systems, improving overall hygiene.

Objectives of a Public Water Supply Scheme

- To supply safe and wholesome water to the public.
- To supply water in adequate quantity to meet daily domestic, commercial, and industrial demands.
- To make water readily available to consumers to encourage personal and household cleanliness.
- To supply water at convenient points and at a reasonable cost.
- To ensure sufficient pressure in the distribution system for firefighting.

Need for Protected Water Supply

- Raw water from natural sources often contains pathogenic bacteria, suspended impurities, and dissolved salts.
- Consuming untreated water leads to severe epidemics and high mortality rates, especially in developing regions.
- 'Protected' means the water is safeguarded against contamination from its source all the way to the consumer's tap.
- Involves strict regulatory standards (e.g., WHO guidelines, IS 10500 in India) for drinking water quality.

Role and Duties of a Water Supply Engineer

- Forecasting Demand: Estimating the future population and their per capita water requirement over the design period (usually 30 years).
- Source Identification: Locating sustainable and economical water sources (rivers, lakes, aquifers).
- Design of Structures: Designing intake works, conduits, pumping stations, and treatment plant units.
- Distribution Network Planning: Layout of pipes, valves, and elevated service reservoirs (ESRs) to maintain pressure.
- Maintenance and Operation: Ensuring the system runs efficiently, minimizing water loss (Non-Revenue Water), and managing repairs.

Challenges in Modern Water Supply

- Depletion of Sources: Over-extraction of groundwater and drying up of surface sources due to climate change.
- Pollution: Increasing industrial effluents and untreated sewage contaminating fresh water bodies.
- Aging Infrastructure: Leaky pipes leading to high percentage of unaccounted-for water in older cities.
- Financial Constraints: High capital and maintenance costs versus low water tariffs recovered from consumers.

Impact on Public Health

- Historical perspective: John Snow's 1854 Broad Street cholera outbreak investigation proved water transmits disease.
- Providing clean water reduces morbidity and mortality, increasing life expectancy and economic productivity.
- Water sanitation and hygiene (WASH) are fundamental components of global public health strategies.

Summary

- Water supply engineering is vital for civilization, health, and industry.
- The main objective is to provide safe, adequate, and pressurized water economically.
- A water engineer plans, designs, and maintains these complex systems.
- Modern challenges require innovative and sustainable engineering solutions.

Preview of Next Lecture

- Where do we get this water from?
- Types of water sources: Surface vs. Subsurface.
- How do we evaluate if a source is suitable?
- Criteria for the selection of a water source for a city.